Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

Claims 1 – 29 (cancelled)

Claim 30 (previously presented):A composite (M) comprising:

a) at least 75 vol% of a mixed electronic/oxygen O^{2-} anionic conducting compound (C_1) chosen from doped ceramic oxides which, at the use temperature, are in the form of a crystal lattice having oxide ion vacancies and more particularly in the form of a cubic phase, fluorite phase, aurivillius-type perovskite phase, brown-millerite phase or pyrochlore phase; and

b) from 0.01 to 25 vol% of a compound (C_2), different from compound (C_1), chosen from ceramics of oxide type, ceramics of nonoxide type, metals, metal alloys or mixtures of these various types of materials; and

c) from 0 vol% to 2.5 vol% of a compound (C_3) produced from at least one chemical reaction represented by the equation:

$xF_{C1} + yF_{C2} \rightarrow zF_{C3}$,

in which equation F_{C1}, F_{C2} and F_{C3} represent the respective crude formulae of compounds (C_1), (C_2) and (C_3) and x, y and z represent rational numbers greater than or equal to 0.

Claim 31 (previously presented):The composite of claim 30, in which the grains of compound (C_2) have an equiaxed shape with a diameter ranging from 0.1 µm to 5 µm and preferably less than 1 µm.

Claim 32 (previously presented):The composite of claim 30, in which the volume fraction of compound (C_3) does not exceed 1.5% and more particularly does not exceed 0.5% by volume.

Claim 33 (previously presented):The composite of claim 32, in which the volume fraction of compound (C_3) in the composite tends toward 0.

Claim 34 (previously presented):The composite of claim 30, in which the volume fraction of compound (C_2) is not less than 0.1% but does not exceed 10%.

Claim 35 (previously presented):The composite of claim 34, in which the volume fraction of compound (C_2) does not exceed 5%.

Claim 36 (previously presented):The composite of claim 30, in which compound (C_2) is chosen from oxide-type materials and preferably from magnesium oxide (MgO), calcium oxide (CaO), aluminum oxide (Al_2O_3), zirconium oxide (ZrO_2), titanium oxide (TiO_2), mixed strontium aluminum oxides $SrAl_2O_4$ or $Sr_3Al_2O_6$, mixed barium titanium oxide ($BaTiO_3$), mixed calcium titanium oxide ($CaTiO_3$), $La_{0.5}\ Sr_{0.5}\ Fe_{0.9}\ Ti_{0.1}\ O_{3-\delta}$ or $La_{0.6}\ Sr_{0.4}\ Fe_{0.9}\ Ga_{0.1}\ O_{3-\delta}$.

Claim 37 (previously presented):The composite of claim 30, in which compound (C_2) is chosen from materials of the nonoxide type and preferably from silicon carbide (SiC), boron nitride (BN), nickel (Ni), platinum (Pt), palladium (Pd) and rhodium (Rh).

Claim 38 (previously presented):The composite of claim 30, in which compound (C_1) is chosen from oxides of formula (I):

$(R_aO_b)_{1-x}\ (R_cO_d)_x$ (I),

in which:

a) R_a represents at least one trivalent or tetravalent atom mainly chosen from bismuth (Bi), cerium (Ce), zirconium (Zr), thorium (Th), gallium (Ga) and hafnium (Hf), and a and b are such that the structure R_aO_b is electrically neutral;

b) R_c represents at least one divalent or trivalent atom chosen mainly from magnesium (Mg), calcium (Ca), barium (Ba), strontium (Sr), gadolinium

(Gd), scandium (Sc), ytterbium (Yb), yttrium (Y), samarium (Sm), erbium (Er), indium (In), niobium (Nb) and lanthanum (La), and c and d are such that the structure R_cO_d is electrically neutral; and

c) in which x is generally between 0.05 and 0.30 and more particularly between 0.075 and 0.15.

Claim 39 (previously presented):The composite of claim 38, in which compound (C_1) is chosen from stabilized zirconias of formula (Ia):

$(ZrO_2)_{1-x}(Y_2O_3)_x$ (Ia),

in which x is between 0.05 and 0.15.

Claim 40 (previously presented):The composite of claim 30, in which compound (C_1) is chosen from perovskite oxides of formula (II):

$[Ma_{1-x-u}Ma'_xMa"_u][Mb_{1-y-v}Mb'_yMb"_v]O_{3-w}$ (II)

in which:

a) Ma represents an atom chosen from scandium, yttrium, or from the families of lanthanides, actinides or alkaline-earth metals;

b) Ma', which is different from Ma, represents an atom chosen from scandium, yttrium or from the families of lanthanides, actinides or alkaline-earth metals;

c) Ma", which is different from Ma and Ma', represents an atom chosen from aluminum (Al), gallium (Ga), indium (In), thallium (Tl) or from the family of alkaline-earth metals;

d) Mb represents an atom chosen from transition metals;

e) Mb', which is different from Mb, represents an atom chosen from transition metals, aluminum (Al), indium (In), gallium (Ga), germanium (Ge), antimony (Sb), bismuth (Bi), tin (Sn), lead (Pb) and titanium (Ti);

f) Mb", which is different from Mb and Mb', represents an atom chosen from transition metals, alkaline-earth metals, aluminum (Al), indium (In), gallium (Ga), germanium (Ge), antimony (Sb), bismuth (Bi), tin (Sn), lead (Pb) and titanium (Ti);

$0 < x \leq 0.5$;

$0 \leq u \leq 0.5$;

$(x + u) \leq 0.5$;

$0 \leq y \leq 0.9$;

$0 \leq v \leq 0.9$;

$0 \leq (y + v) \leq 0.9$; and

w is such that the structure in question is electrically neutral.

Claim 41 (previously presented):The composite of claim 40, in which compound (C_1) is chosen from compounds of formula (IIa):

$La_{(1-x-u)}Ma'_xMa''_uMb_{(1-y-v)}Mb'_yMb''_vO_{3-\delta}$ (IIa),

corresponding to formula (II), in which Ma represents a lanthanum atom.

Claim 42 (previously presented):The composite of claim 40, in which compound (C_1) is chosen from compounds of formula (IIb):

$Ma_{(1-x-u)}Sr_xMa''_uMb_{(1-y-v)}Mb'_yMb''_vO_{3-\delta}$ (IIb),

corresponding to formula (II) in which Ma' represents a strontium atom.

Claim 43 (previously presented):The composite of claim 40, in which compound (C_1) is chosen from compounds of formula (IIc):

$Ma_{(1-x-u)}Ma'_xMa''_uFe_{(1-y-v)}Mb'_yMb''_vO_{3-\delta}$ (IIc),

corresponding to formula (II) in which Mb represents an iron atom.

Claim 44 (previously presented):The composite of claim 40, in which compound (C_1) is chosen from compounds of formula (IId):

$La_{(1-x)}Sr_xFe_{(1-v)}Mb''_vO_{3-\delta}$ (IId),

corresponding to formula (II) in which u = 0, y = 0, Mb represents an iron atom, Ma represents a lanthanum atom and Ma' represents a strontium atom.

Claim 45 (previously presented):The composite of claim 40, in which compound (C_1) is a compound of formula:

a) $La_{(1-x-u)}Sr_xAl_uFe_{(1-v)}Ti_vO_{3-\delta}$,

b) $La_{(1-x-u)}Sr_xAl_uFe_{(1-v)}Ga_v\ O_{3-\delta}$,

c) $La_{(1-x)}Sr_xFe_{(1-v)}Ti_vO_{3-\delta}$,

d) $La_{(1-x)}Sr_xTi_{(1-v)}Fe_v\ O_{3-\delta}$,

e) $La_{(1-x)}Sr_xFe_{(1-v)}Ga_vO_{3-\delta}$ or

f) $La_{(1-x)}Sr_xFeO_{3-\delta}$.

Claim 46 (previously presented):The composite of claim 45, of formula:

a) $La_{0.6}\ Sr_{0.4}\ Fe_{0.9}\ Ga_{0.1}\ O_{3-\delta}$, or

b) $La_{0.5}\ Sr_{0.5}\ Fe_{0.9}\ Ti_{0.1}\ O_{3-\delta}$.

Claim 47 (previously presented):The composite of claim 40, in which compound (C_1) is chosen from those of formula (II'):

$$Ma^{(a)}_{(1-x-u)}Ma'^{(a-1)}_{x}Ma''^{(a'')}_{u}Mb^{(b)}_{(1-s-y-v)}Mb^{(b+1)}_{s}Mb'^{(b+\beta)}_{y}Mb''^{(b'')}_{v}O_{3-\delta} \qquad \text{(II')},$$

in which formula (II'):

a) a, a-1, a", b, (b+1), (b+β) and b" are integers representing the respective valences of the Ma, Ma', Ma", Mb, Mb' and Mb" atoms; and a, a", b, b", β, x, y, s, u, v and δ are such that the electrical neutrality of the crystal lattice is preserved,

b) $a > 1$;

c) a", b and b" are greater than zero;

d) $-2 \leq \beta \leq 2$;

e) $a + b = 6$;

f) $0 < s < x$;

g) $0 < x \leq 0.5$;

h) $0 \leq u \leq 0.5$;

i) $(x + u) \leq 0.5$;

j) $0 \leq y \leq 0.9$;

k) $0 \leq v \leq 0.9$;

l) $0 \leq (y + v + s) \leq 0.9$;

m) $[u (a" - a) + v (b" - b) - x + s + \beta y + 2\delta] = 0$; and

n) $\delta_{min} < \delta < \delta_{max}$,

where:

$\delta_{min} = [u (a - a") + v (b - b") - \beta y] / 2$ and

$\delta_{max} = [u (a - a") + v (b - b") - \beta y + x] /2$, and

Ma, Ma', Ma", Mb, Mb' and Mb" are as defined above, Mb representing an atom chosen from transition metals capable of existing in several possible valences.

Claim 48 (previously presented):The composite of claim 30, in which compound (C_1) is chosen from oxides of formula (III):

$[Mc_{2-x}Mc'_x][Md_{2-y}Md'_y]O_{6-w}$ (III)

in which:

a) Mc represents an atom chosen from scandium, yttrium or from the families of lanthanides, actinides and alkaline-earth metals;

b) Mc', which is different from Mc, represents an atom chosen from scandium, yttrium or from the families of lanthanides, actinides and alkaline-earth metals;

c) Md represents an atom chosen from transition metals; and

d) Md', which is different from Md, represents an atom chosen from transition metals, aluminum (Al), indium (In), gallium (Ga), germanium (Ge), antimony (Sb), bismuth (Bi), tin (Sn), lead (Pb) and titanium (Ti); and

e) x and y are greater than or equal to 0 and less than or equal to 2 and w is such that the structure in question is electrically neutral.

Claim 49 (previously presented):The composite of claim 48, in which compound (C_1) is of formula (IIIa):

$[Mc_{2-x}La_x][Md_{2-y}Fe_y]O_{6-w}$ (IIIa),

a compound of formula (IIIb):

$[Sr_{2-x}La_x][Ga_{2-y}Md'_y]O_{6-w}$ (IIIb)

and more particularly a compound of formula (IIIc):

$[Sr_{2-x}La_x][Ga_{2-y}Fe_y]O_{6-w}$ (IIIc).